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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,623	11/07/2001	John Nicholas Wilson	450110-03581	5839

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EXAMINER

TRAN, KHANH C

ART UNIT PAPER NUMBER

2631

DATE MAILED: 04/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/036,623

Applicant(s)

WILSON ET AL.

Examiner

Khanh Tran

Art Unit

2631

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 10, 11, 15, 16, 18, 24 and 26-29 is/are rejected.
- 7) ☒ Claim(s) 3, 5-9, 12-14, 17, 19-23 and 25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 02/28/02 & 02/23/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 2 is objected to because of the following informalities: in line 4, "comprising" should be changed to -- comprising: --. Appropriate correction is required.
2. Claim 29 is objected to because of the following informalities: in line 3, "claim 28" should be changed to -- claim 26 --. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2, 4, 10-11, 15-16, 18, 24 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee U.S. Patent 6,373,861 B1.

Regarding claim 1, in column 6, lines 8-26, Lee invention is directed to a frequency synchronizing device for OFDM/CDMA communication system which exchanges data using an OFDM frame including OFDM symbols each comprised of a plurality of data samples, and a guard interval inserted at the head of each symbol to prevent interference between the symbols.

Referring to figure 5, figure 5 illustrates a frequency-synchronizing device

for a receiver in an OFDM/CDMA system. In column 7, lines 5-65, Lee does not expressly teach a matched filter having an impulse response as claimed. The frequency-synchronizing device includes a coarse frequency synchronizer 180 comprising a correlation value detector 167. The correlation value detector 167 performs calculation of the correlation value. Because correlator and matched filter perform similar function of correlating between input signals, one of ordinary skill in the art would have recognized that the interchangeability of the correlation value detector 167 in Lee invention for the corresponding matched filter disclosed in the claim.

The correlation value detector 167 receives the guard interval and the copy data from the interval/carrier extractor 166 and the shift index value from the shift index generator 165, and extracts a correlation value while shifting the guard interval and the copy data on a sample data unit basis. The sample data unit basis being an OFDM symbol; see column 7, lines 25-40. Lee further shows a controller 195 controlling the overall operation of the frequency-synchronizing device. The controller 195 corresponds to the claimed controller. The act of calculating correlation value while shifting the guard interval and the copy data on a sample data unit basis corresponds to the claimed *"adapting the impulse response of the matched filter to the signal samples of the guard signal samples as set forth in the claim"*.

The MIN/MAX detector 168 detects the minimum value according to the coarse delay signal input from the controller 195 for the coarse frequency synchronization. The minimum value detected at this point is a coarse estimation signal; see column 7, lines 35-50. Similarly, with regard to the regular frequency synchronizing method, the MIN/MAX detector 168 detects a correlation value having the maximum power out of the correlation values. After estimation of the coarse frequency offset and the regular frequency offset, an adder 169 adds the coarse estimation signal to the regular estimation signal to generate the first frequency correction signal; see column 7 line 65 via column 8 line 39. In view of that, the first frequency correction signal corresponds to the claimed location of the sync position.

Regarding claim 2, as appreciated by one of ordinary skill in the art, the controller 195 controls the shift index generator 165 to provide the shift index value to the correlation value detector 167 starting from a course estimate of the sync position initially; see column 7, lines 7-25.

As recited in claim 1, the correlation value detector 167 receives the guard interval and the copy data from the interval/carrier extractor 166 and the shift index value from the shift index generator 165, and extracts a correlation value while shifting the guard interval and the copy data on a sample data unit basis. The sample data unit basis being an OFDM symbol; see column 7, lines 25-40. The delay 64 corresponds to the claimed temporal separation. The MIN/MAX detector 168 detects the minimum

~~value according to the coarse delay signal input from the controller 195 for the coarse~~
frequency synchronization. The minimum value detected at this point is a coarse estimation signal; see column 7, lines 35-50. Similarly, with regard to the regular frequency synchronizing method, the MIN/MAX detector 168 detects a correlation value having the maximum power out of the correlation values. After estimation of the coarse frequency offset and the regular frequency offset, an adder 169 adds the coarse estimation signal to the regular estimation signal to generate the first frequency correction signal; see column 7 line 65 via column 8 line 39. In light of the foregoing, the first frequency correction signal corresponds to the claimed coarse sync position estimation.

Regarding claim 4, as recited in claim 2, the MIN/MAX detector 168 detects the minimum value according to the coarse delay signal input from the controller 195 for the coarse frequency synchronization. The minimum value detected at this point is a coarse estimation signal; see column 7, lines 35-50. Similarly, with regard to the regular frequency synchronizing method, the MIN/MAX detector 168 detects a correlation value having the maximum power out of the correlation values. After estimation of the coarse frequency offset and the regular frequency offset, an adder 169 adds the coarse estimation signal to the regular estimation signal to generate the first frequency correction signal; see column 7 line 65 via column 8 line 39.

Regarding claim 10, referring to figure 1, a transmitter 100 includes an IFFT 104

performing OFDM modulation on data samples in frequency domain. The Tx filter 106 converts the data into time domain. Referring to figure 5, the frequency-synchronizing device comprises a fast fourier transform (FFT) for performing an FFT operation on the received samples.

Regarding claim 11, Lee teachings apply to OFDM/CDMA system.

Regarding claim 15, claim 1 comprises elements performing all the steps of claim 15, therefore, claim 15 is rejected on the same ground as for claim 1.

Regarding claim 16, claim 2 comprises elements performing all the steps of claim 16, therefore, claim 16 is rejected on the same ground as for claim 2.

Regarding claim 18, claim 4 comprises elements performing all the steps of claim 18, therefore, claim 18 is rejected on the same ground as for claim 4.

Regarding claim 24, claim 10 comprises elements performing all the steps of claim 24, therefore, claim 24 is rejected on the same ground as for claim 10.

Regarding claim 26, with all the elements of claim 1 being taught by Lee, one of ordinary skill in the would have recognized that those elements can be implemented as

~~a computer program loaded onto a computer to operate the frequency synchronizing~~
device as taught in Lee invention. The motivation for doing that is to simulate the device before implemented on hardware.

Regarding claim 27, using analogous reasoning as in claim 26, one of ordinary skill in the would have recognized that those elements can be implemented as a computer program loaded onto a computer to perform the method steps of the frequency synchronizing device as taught in Lee invention. The motivation for doing that is to simulate the steps before implemented on hardware.

Regarding claims 28-29, as well known in the art, a computer hard drive can be used to record the computer instructions as claimed in claims 26-27.

Allowable Subject Matter

4. Claims 3, 5-6, 7-9, 12-14, 17, 19-23, 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

~~5. The prior art made of record and not relied upon is considered pertinent to~~
applicant's disclosure.

Belotserkovsky et al. U.S. Patent 6,771,591 B1 discloses "Method And System For Processing Orthogonal Frequency Division Multiplexed Signals".

Belotserkovsky et al. U.S. Patent 6,650,617 B1 discloses "Reduced Complexity FFT Window Synchronization For An Orthogonal Frequency Division Multiplexing Systems".

Taura et al. U.S. Patent 6,438,183 B1 discloses "Digital Audio Broadcast Receiver And Tuning Method Thereof".

Maekawa et al. U.S. Patent 6,731,624 B1 discloses "Sync Signal Detection Method And Raio Communication System.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

Khanh Cong Tran

03/18/2005

Examiner KHANH TRAN